

REMARKS

This amendment responds to the office action dated November 15, 2005.

The Examiner objected to the Abstract as being too short. The applicant has amended the Abstract to include fifty words.

The Examiner objected to claim 1 because it ended in a comma rather than a period. Claim 1 has been amended to correct this typographical error. In addition, each of independent claims 1, 9, 18, and 28 included the typographical error “sensing using an imaging device” which has been corrected to “using an imaging device to sense.”

The Examiner rejected each of claims 1-32 under 35 U.S.C. § 102(e) as being anticipated by Ulichney et al., U.S. Patent App. Pub. No. 2005/0052618 (hereinafter Ulichney). That reference discloses a projector system that corrects keystone distortion in a projected image by using a camera aimed at the projection screen or other surface upon which the image is projected. *See* Ulichney at col. FIGS 2 and 5. In a first embodiment, the user must position the camera so that its optical axis is perpendicular to the projection surface. *See Id.* at col. 2 par. 0025. With this constraint, it can be mathematically assumed that the camera’s coordinate system *substitutes for* a theoretical coordinate system within the boundaries of the projection screen. *See Id.* at par. 26. *No actual measurements of the projection screen are obtained by the camera*, as the assumption of perpendicularity permits the mathematical correction of keystone distortion in the projected image. Specifically, the *camera’s coordinate system* is used as a reference to adjust a keystone-distorted image on the projection screen, so that it is correctly displayed as a rectangle in the *camera’s coordinate system* (and therefore the non-measured coordinate system of the screen, due to the perpendicular positioning of the camera’s optical axis to the screen’s surface). *See Id.* at par. 0028 to par. 0035

Similarly, in a second embodiment, the camera is positioned with its optical axis oriented at an oblique, i.e. non-perpendicular, angle to the surface of the screen. *Id.* at par. 0043. In this embodiment, because the camera’s coordinate system will exhibit keystone distortion with respect to the coordinate system of the screen, the projected image cannot be corrected without additional information. *Id.* at par. 0046. Specifically, Ulichney discloses that *a user must input*

the aspect ratio α of the screen, and the camera's coordinate system is then adjusted to be bounded by the rectangle $(0, \alpha) (1, \alpha) (1, 0)$ and $(0, 0)$. *Id.* at par. 0046 (stating that the camera is assumed to be viewing a rectangle having a known aspect ratio, typically input by a user) and par. 0058. With this adjusted *camera* coordinate system, the keystone distortion of the image may be corrected in the same manner as that of the first disclosed embodiment. *Id.* at par. 0058 to par. 0061. Again, *no actual measurements of the projection screen are imaged by the camera*, as the aspect ratio input by the user provides all the missing information needed to correct keystone distortion in the projected image.

Though Ulichney discloses aiming a camera at a projection screen displaying a projected image, nowhere does Ulichney disclose either (1) that the camera's field of view encompasses the entire projection screen so as to view its boundaries or (2) that the camera or projector includes software to distinguish the boundaries of the projection screen from its background. Therefore, the system of Ulichney cannot be read as disclosing the steps of using an imaging device to sense *any* information relating to the boundaries of the projection screen, such as height, width, aspect ratio, other dimensions, or color, etc.

Independent claims 1 and 9 each include the limitation of "using an imaging device to sense an indication of the height of a projection screen and the width of a projection screen." Ulichney does not disclose this limitation. As stated in the preceding paragraphs, the first embodiment of the system disclosed by Ulichney requires no information to be obtained about the projection surface, because it is already known that the camera, which images the keystone-distorted image on the projection screen, has its optical axis perpendicular to the screen such that the distorted image may be corrected using *only* the camera's coordinate system. Similarly, the second embodiment disclosed by Ulichney requires a user to input the aspect ratio of the projection screen so that the camera's coordinate system may be stretched or squeezed to that aspect ratio, and the modified camera's coordinate system used to correct the keystone-distorted image imaged in the camera's coordinate system.

Furthermore, each of independent claims 1 and 9 have been amended to include the additional limitation of "determining without user input an aspect ratio for said projection

screen.” The first embodiment disclosed by Ulichney does not determine an aspect ratio of the projection screen in the first instance. The second embodiment requires a user to input the aspect ratio of the screen. Thus, Ulichney fails to disclose this amended limitation, as well.

Therefore, for the reasons stated in each of the preceding two paragraphs, Independent claims 1 and 9, as well as their dependent claims 2-8 and 10-17, respectively, patentably distinguish over Ulichney. The Examiner’s rejection of these claims should therefore be withdrawn.

Independent claim 18 includes the limitations of “using an imaging device to sense the boundaries of a projection screen” and “decreasing the scale of an image projected on said projection screen based on sensed said boundaries.” As stated previously, Ulichney fails to disclose the step of sensing the boundaries of a projection screen, but instead alternatively uses one of two assumptions (perpendicularity of the optical axis of the camera to the screen and an input screen aspect ratio, respectively) to perform the required calculations to correct keystone distortion. Therefore independent claim 18, as well as its dependent claims 19-27 are each patentably distinguished over the cited reference and the Examiner’s rejection of these claims should be withdrawn.

Independent claim 28 includes the limitations of “sensing the boundary color of said projection screen” and “modifying said image based on said boundary color.” These limitations are not disclosed by Ulichney. The Examiner points to paragraph 0022 of Ulichney, however that paragraph merely refers to the fact that the *projected image* contains color information, from which luminance values may be extracted and adjusted when making corrections. Nowhere does Ulichney disclose the step of sensing the color of the boundary of the projection screen. Moreover, as stated previously with respect to claims 1 and 8, Ulichney fails to disclose using *any* information about the projection screen that is sensed by the camera, *for any purpose*, but instead either requires a user to mount a camera perpendicular to the screen or *input* required information about the screen rather than sensing information about the screen. Therefore, independent claim 28, as well as its dependent claims 29-32 are each patentably distinguished over the cited reference and the Examiner’s rejection of these claims should be withdrawn.

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In view of the foregoing amendments and remarks, the applicant respectfully requests reconsideration and allowance of claims 1-32.

Respectfully submitted,



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